ENGG*2560 Environmental Engineering Systems
Winter 2017

School of Engineering

1 INSTRUCTIONAL SUPPORT

1.0 Instructor

Instructor: Cameron Farrow, PhD
Office: THRN 2361, ext. 53385
Email: cfarrow@uoguelph.ca
Office hours: Open door policy and by appointment

1.1 Lab Technicians

Joanne Ryks
THRN1114
jryks@uoguelph.ca

Ryan Smith
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1.2 Teaching Assistants

GTA	Email	Office Hours
Tao Tao	ttao@uoguelph.ca	None
Akul Bhatt	akul@uoguelph.ca	None

2 LEARNING RESOURCES

2.0 Course Contact Hours (Lectures, Labs, & Tutorials)

The lectures, labs and tutorials are the primary means used to support your learning in this course. Lectures will be the primary means for course news and announcements in addition to provision of course materials. Lecture attendance is expected. Tutorials will be the primary means for the instructional team to coach you. Tutorial attendance is expected. Labs will be the primary means for hands-on experience. Lab attendance is required.

2.1 Course Website

ENGG*2560 Courselink site will provide copies of lecture slides, laboratory descriptions and assignments.

2.2 Required Resources

None

2.3 Recommended Resources

None

2.4 Additional Resources

Lecture Information: All the lecture slides will be posted on Courselink.

Lab Information: Posted on Courselink.

Assignments: Posted on Courselink.

2.5 Communication & Email Policy

Communication associated with course material is delivered by a combination of the lectures, lab/tutorials and the Courselink site. It is your responsibility to receive communication from ALL of these sources – there will be some mutual reinforcement between these sources but they are not completely redundant. As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.0 Dates and Distribution

Final Exam	40%	Thursday, April 13th: 2:30-4:30 PM
Midterms (2)	20%	Midterm 1 - Monday February 6th (In-Class) Midterm 2 - Monday March 20th (In-Class)
Laboratory	10% 20% 10%	Batch Reactor Lab – Due Saturday, Feb 4th, 6:00 PM Reactor Systems Lab – Due Saturday, March 4th, 6:00 PM Noise Lab – Due Saturday, April 1st, 6:00 PM

3.1 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor **within two weeks of the start** of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: To pass the course students must obtain a grade of 50% or higher.

Missed test: If you miss the test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam.

Lab Work: You must pass the laboratory safety quiz to be permitted to complete the hands on laboratories. You must attend and complete the hands on laboratory in order to be eligible to complete the required written laboratory report.

Late Lab Reports: Late submissions (without instructor permission based on suitable grounds and documentation) will be penalized. The penalty will depend on how late: 10% for 1-12 hours; 25% for 12-48 hours; 50% for 48-96 hours and 100% after 96 hours.

Teamwork: Teamwork is required for the completion of the three labs in the course. It is expected that you are an active member of the team and provided an approximately equal contribution to the submitted work. If it becomes apparent that this is not the case then the instructor may assign a substantially different (lower) grade for a member of the team.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.0 Calendar Description

Analysis techniques for natural and engineered systems including chemical, physical and biological processes. Mass balance analysis for steady state and unsteady state situations. Analysis under both equilibrium and non-equilibrium conditions. Reactor types including batch, plug-flow, CSTR. Noise pollution, control and prevention.

Prerequisite(s): CHEM*1050, MATH*2270

4.1 Course Aims

This course aims to establish fundamental chemical engineering skills necessary to address environmental engineering systems. The course also aims to introduce basic noise modelling and control approaches.

4.2 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Apply chemical mass balances to a range of environmental engineering components.
2. Develop mathematical models of a range of environmental engineering systems.
3. Develop computer models of environmental engineering systems.
4. Explain basic noise control approaches.
5. Apply basic noise modelling equations.
6. Develop computer models of noise equations.
7. Demonstrate safe laboratory practices based on guidance provided.
8. Produce experimental results in an interpretable form (effective tables and figures).
9. Formulate a credible set of conclusions and recommendations based on experimental objectives.
10. Prepare a well-structured laboratory report.

4.3 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 4, 5	Exams, Labs
2. Problem Analysis	1, 2, 4, 5	Exams, Labs
3. Investigation	7, 8, 9, 10	Labs
4. Design	-	
5. Use of Engineering Tools	3, 6, 7	Labs
6. Communication	10	Labs
7. Individual and Teamwork	-	Labs
8. Professionalism	-	
9. Impact of Engineering on Society and the Environment	1-10	Exams, Labs
10. Ethics and Equity	-	
11. Business & Project Management	-	
12. Life-Long Learning	3, 6	Labs

4.4 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.5 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.6 Relationships with other Courses & Labs

Previous Courses:

CHEM*1040/1050: Chemicals are generally pollutants. Chemical properties are key to pollutant impacts and pollutant treatment and prevention and resource recovery.

CIS*1500: Programming logic.

ENGG*1500: Manipulating variables and equations is an essential skill.

MATH*2270: Applied Differential Equations: Mathematics employed to solve mass transfer problems.

Follow-on Required Courses:

ENGG*3180: Air Quality (required for EE's only). Chemical behaviour in the atmosphere relies on ENGG*2560, Fluid Mechanics and Thermodynamics.

ENGG*3590: Water Quality. Chemical behaviour in water relies on ENGG*2560.

ENGG*3470: Mass transfer operations (required for EE's only). An extension of the principles of ENGG*2560 to systems with mass transfer limitations between phases (i.e. non-equilibrium).

ENGG*4340: Solid & Hazardous Waste Management (required for EE's only).

Follow-on Elective Courses:

ENGG*4070: Life Cycle Assessment for Sustainable Design

ENGG*4240: Site Remediation

ENGG*4760: Biological Wastewater Treatment Design

ENGG*4770: Physical & Chemical Wastewater Treatment Design

ENGG*4810: Control of Atmospheric Particulates

ENGG*4820: Atmospheric Emission Control – Combustion Systems

5 TEACHING AND LEARNING ACTIVITIES

5.0 Timetable

Lectures:			
M, W, F		12:30 – 1:20	ROZH 102
Tutorials & Labs			
Tuesday	Sec 01	8:30 – 10:20	THRN 1002 / 2336 / 1116
Thursday	Sec 02	1:30 – 3:20	THRN 1002 / 2336 / 1116
Monday	Sec 03	10:30 – 12:20	THRN 1002 / 2336 / 1116
Monday	Sec 04	2:30 – 4:20	THRN 1002 / 2336 / 1116

* You may only attend an alternate tutorial or lab time with prior permission of the instructor

See section 5.2 for a detailed overview of the lab/tutorial schedule.

5.1 Lecture Schedule

Lectures (Approx.)	**Lecture Topics**	**Learning Objectives**
1	Introduction	ALL
2-5	Mass & Energy Balance Principles	1, 2
6-18	Reactors & Chemical Kinetics	1, 2
19-21	Biochemical Kinetics & Reactors	1, 2
22-27	Noise	4, 5
28-33	Equilibrium	1, 2
34	Growth	1, 2
35	Wrap-up, Course Evaluation	ALL

5.2 Tutorial & Lab Schedule

Week of	Tutorial		Lab THRN 1116
	THRN 1002	THRN 2336	
Jan 9			
Jan 16	Problem Sets		
Jan 23			Batch Reactors
Jan 30	Problem Sets		
Feb 6			Reactor Systems
Feb 13			Reactor Systems
Feb 20	Reading Week		
Feb 27		Simulink	
Mar 6	Problem Sets		
Mar 13		Programming	
Mar 20	Problem Sets		
Mar 27	Problem Sets		
Apr 3	Problem Sets		

The Physical Noise Lab experiments will be completed outside of scheduled lab times during the period from March 6th to March 17th.

5.3 Other Important Dates

Monday, January 9: First day of class
Monday, February 20 – Friday, February 24: Reading Week
Friday, March 10: 40th class: Last day to drop single semester courses
Friday, April 7: Final Class

6 LAB SAFETY

6.0 School of Engineering Policy

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

6.1 ENGG*2560 Specific

Pre-Lab Safety Quiz must be passed prior to starting the lab. You will not be permitted to conduct your lab until all team members have individually passed the quiz (on-line courselink). You may be asked equivalent safety questions in the lab and poor responses may lead to you being asked to leave the lab.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.0 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 56208, email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, GTA, technician, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index